Feb. 9, 1960 B. F. HENDRICKSON 2,924,334

COAL-SIZING SCREEN

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FIG. 1

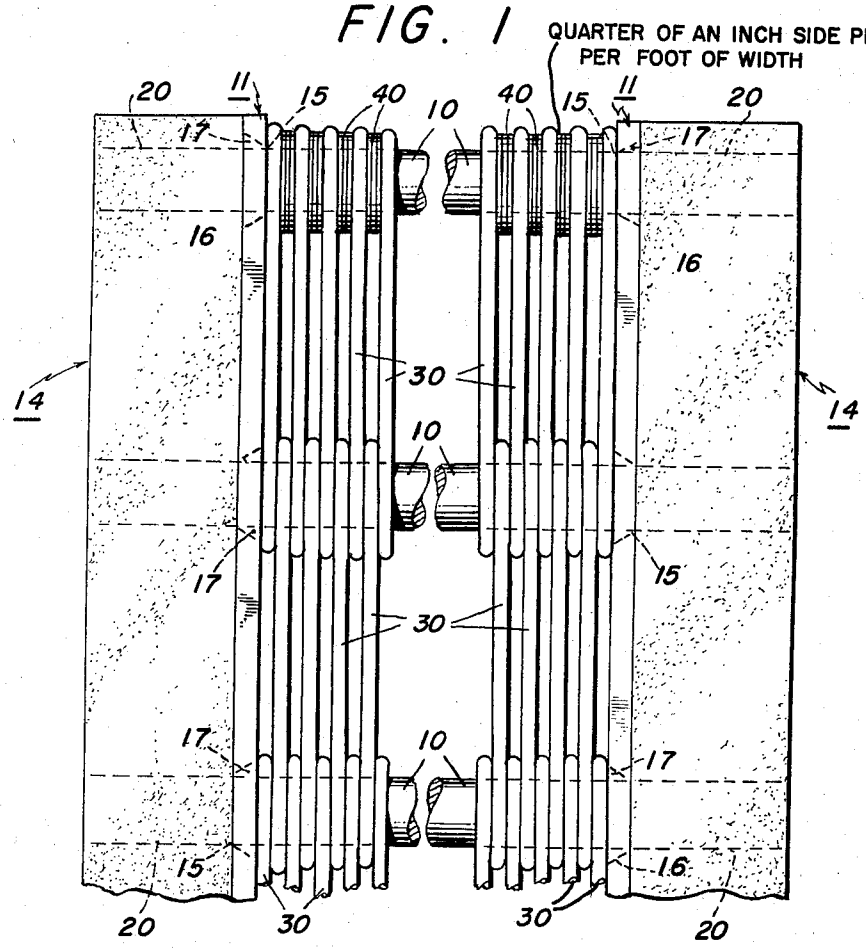


FIG. 2

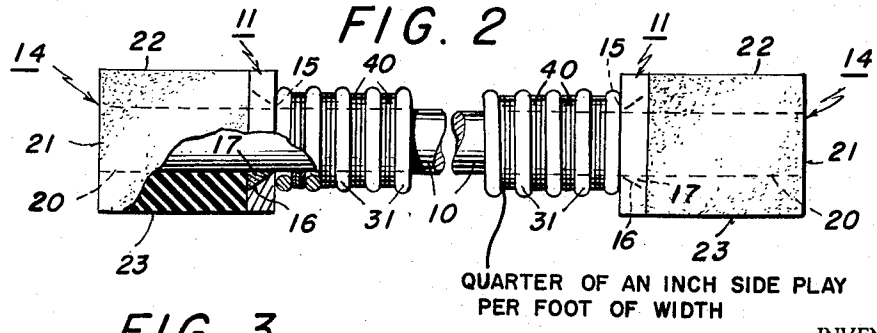
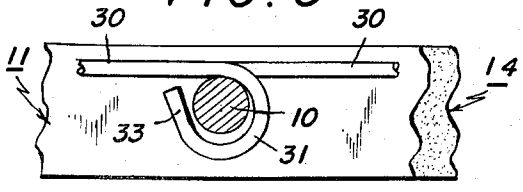


FIG. 3



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COAL-SIZING SCREEN

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10 Claims. (Cl. 209—393)

This invention relates to vibrator screens and has for its principal object the provision of a sturdy screen capable of great animation and free of tendency to blind or blank out when screening masses of wet material.

An important feature of the invention is the provision of a light weight screen particularly suited to vibrator use in connection with the making ready for commercial use of all grades of coal and especially wet bituminous coal handled in quantities up to and exceeding ten thousand tons per day per screen.

A further object of the invention is to provide a screen which can be put into use and then forgotten as far as maintenance is concerned for it has no parts which come in contact with the coal or other material to be screened which could get out of shape or become useless by reason of breakage, the coal coming in contact with no part which is bolted, welded or rigidly secured.

The best screens now obtainable for use with present day coal preparation methods, while quite sturdy, are of such weight that the vibrator must operate at a slower rate than is desired. The heavy weight of such coal sizing screens also tends to shorten appreciably the life of the screen, the normal period of use being about three months. By using sturdy round tie rods which do not come in contact with the material being screened and mounting links of round wire on these tie rods the total weight is reduced to such an extent that the vibrator may operate at a fast rate of speed, the rigid screen frame of transverse tie rods and longitudinal steel bars may be provided with a shock absorber cushion of simple design, the area through which the material may pass is increased from 30% to 40%, and the useful life of the screen is increased manyfold. Obviously the screening spaces may be made to suit any circumstances by merely substituting a different diameter of wire stock material from which to form the links, or by the use of washers between the looped ends of the links, or both.

In the drawings:

Figure 1 is a plan view.

Figure 2 is an end elevation.

Figure 3 is a central longitudinal section.

The screen consists primarily of a sturdy rigid frame, shock absorbing means conveniently side members of the screen and made of elongated rubber strips, and the links which are the only members of the screen which come in contact with the material to be screened.

The preferred form of the screen is one using solid stainless steel half-inch tie rods **10**, each welded to two steel spacer bars **11** so as to form what is substantially an integral frame having such movement in the rubber side members **14** as to give a shock absorber effect when the screen is agitated in any of the usual manners.

A preferred method of securing the spacer bars **11** to the transverse tie rods **10** is by forming holes **15** in the spacer bar of such size as to snugly fit the tie rods, then to countersink these holes as at **16** and finally to weld the tie rods to the spacer bars at each side as by

welds **17** spaced appreciably inward from the ends of the tie rods. The countersinking is of great advantage as the spacer bars **11** may then quite snugly fit the sides of the rubber cushioning members **14**.

The side members **14** are of a heavy grade of solid rubber stock having alined holes **20** to receive the ends of the tie rods **10** as they extend beyond the spacer bars **11** on both sides. While I prefer the ends of the tie rods **10** to extend flush with the outside face **21** of the side cushioning members **14**, they may extend a trifle short of or a trifle beyond this rubber side strip for the cushioning members **14** are engaged by the vibrator (not shown) only at top and bottom **22** and **23** respectively by the rails of the vibrator.

The links, generally numbered **30**, are of round wire of such diameter as to afford the desired spacing between adjacent links. As a typical example, for a screen roughly three feet by four feet the tie rods are solid steel a half inch in diameter, the links are of one-eighth inch stainless steel round wire, and the longitudinally extending rubber side members are four feet long and square in cross section, an inch on the side.

The tie rods are two and a half inches between centers for this size of screen and since the links are in fairly close contact, the space between the links is about their own diameters if no washers are used on the center tie rods, except that to provide the necessary side to side movement of the links a quarter of an inch is provided for each foot of width of the screen so that in six inches of width there will be twenty-three links extending either to the right or left of any one center tie bar and twenty-two links extending in the other direction, assuming an eighth inch diameter link stock.

The links for a 2½" spacing and a bent link of such stainless wire stock would be about 3¼" long overall. Each link is loosely looped as at **31** around two adjacent stainless steel tie rods, the diameter of the loop being 17/32" for a half inch diameter rod. The ends **33** of the link preferably clear the top of the link by about 5/32", no degree of accuracy being necessary because each end **33** is immediately below the flat top of its link and therefore affording no obstruction to the passage of coal between adjacent links.

In order to maintain the end links parallel, I space adjacent loops **31** on the end tie rods by a plurality, shown as three but preferably four, of washers **40**. These, like other metal parts of the screen preferably are of an excellent grade of stainless steel, a convenient gage being .031" for an eighth inch round wire stock of the links. Obviously, a slight increase in screening area is obtained by using five of the washers **40** between each loop on the end bar and by adding an additional washer per intermediate link on each of the many transverse tie rods **10**.

The operation is as follows: The screen is locked in place in the vibrator, usually by bolting the two rubber side members **14** between the usual rails of the vibrator which extend beyond the screen in both directions. The vibrator may have any of the usual motions. The screen works well with the simplest form of vibrator in which the vibrator has a circular motion without any lateral reciprocation. The many links **30** are constantly in motion and the animation may correctly be described as a dancing motion of the links as they rise and fall on the tie rods **10** and in so doing necessarily tilt through the slight angle that is permitted by the small but essential clearance which is provided. Because of the relatively slight weight of the screen, the vibrator can move at a desirable high speed. The rubber side members act as shock absorbers for the rigid frame of the screen as each transverse tie rod end fits snugly in its own hole in the two resilient side members and there is no other con-

nection between the rods and the rubber. While the ends of the loops of the links may be closed just enough to prevent them from coming off the tie rods, it is best to make the gap only a bit greater than the diameter of the link as this will allow ample movement of the links up and down on the tie rods. Direct side to side movement of the links, however, is much more limited as each looped end closely engages an adjacent link on both sides at each center tie rod or by washers if the space is increased by such means. As the vibrator starts its rapid motion, the links begin their many cycles of movement, both up and down, forward and backward, and to a certain degree also from side to side. The looseness of the links and their movements in so many directions readily permit the material to screen through from any direction and at any pressure within reason. Screens of this type which have been in use for much over half a year are still in use, showing no signs of wear or possibility of breakage. This seems to be due in large part to the total absence of welded connections between the links and the tie rods.

What I claim is:

1. A screen for vibrator use in sizing bituminous coal comprising a frame of a pair of longitudinal members and a number exceeding three of parallel transverse members rigidly secured to the longitudinal members, shock absorber means for the frame, and a plurality of rigid links joining adjacent transverse members, said links being spaced from each other and extending loosely around the transverse members so as to have freedom of movement up and down, transversely, and longitudinally of the frame.

2. The device of claim 1 in which the transverse members are round rods and the links are of round wire stock each having a loop at each end to receive a transverse member.

3. The screen of claim 1 in which the links are of round wire stock and have a total width on a transverse member of an amount less than the space between the longitudinal members, said amount per foot of said space being twice the diameter of the wire stock.

4. The screen of claim 1 in which the transverse members are cylindrical tie rods and the links are of round wire having two looped ends, one surrounding each proximate transverse tie rod, the inner diameter of each loop being roughly 1 and 1/16 times the diameter of the rod.

5. The screen of claim 1 in which the transverse members are secured to the longitudinal members in substantially integral fashion and extend into and are imbedded in resilient side members forming the shock absorber means.

6. The screen of claim 1 in which the transverse members are round tie rods, the longitudinal members are steel bars welded to the transverse tie rods and the shock absorber means are two rubber side members square in cross section and having holes therein to receive the ends of the transverse tie rod members and completely enclose same.

7. A light weight boltless screen for vibrator use in sizing bituminous coal comprising a pair of parallel resilient rubber side members square in cross section, each having a series of alined cylindrical holes therein, a flat spacer bar adjacent each side member and having countersunk holes alined with the holes in the side members with the larger diameter of the countersink on the side engaging the side member, a series of round tie rods extending through alined holes and welded to both spacer bars on the face engaging the proximate side member,

and round wire links each having oppositely curved loops at the two ends to surround two adjacent tie rods, with freedom to move up and down a distance roughly equal to 1/16 of the diameter of the tie rod, and washers mounted on the round tie rods between the loops of the links on the end tie rods to hold alternate links generally parallel to the side members but with sufficient looseness to permit each individual link to tilt on adjacent rods and to move away from the tie rods at either or both ends of the link, whereby to afford greater volume of spacing and more screening area.

8. In combination, a rigid frame for vibratory use in screening wet bituminous coal comprising a pair of parallel steel bars having a spaced series of alined countersunk holes therethrough, a series of transverse round steel rods joining the bars and fitting the smaller diameter of said holes, welding material filling the space around the rods in the countersunk holes, with a series of links of round steel wire of about one-fourth of the diameter of the round rods, said links being looped at each end to embrace two adjacent transverse round rods with sufficient play to leave freedom to move up and down, transversely and longitudinally of the frame, and therefore having dancing movement when the screen is given the usual vibrator action.

9. The combination of claim 8 in which the bars, the rods, and the links are of stainless steel, the spacing of the links on the transverse round rods is such as to make the direct side-to-side movement of a link relatively slight by providing an excess transverse width between the parallel steel bars of about a quarter-inch per foot of width of the screen and the size of the loops is such as to make the up and down movement greater than the side-to-side movement.

10. A lightweight, sturdy screen for vibrator use in sizing wet bituminous coal comprising a pair of parallel one-piece resilient rubber side members each having a series of alined cylindrical holes therein, a spacer bar engaging each side member and having countersunk holes alined with the holes in the side members with the larger diameter of the countersink on the side engaging the side members, a series of round tie rods extending through the alined holes and fitting snugly the smaller diameter of such holes, welded to both spacer bars in the space in each countersunk hole surrounding the round rod, and round wire links each having oppositely curved loops to surround two adjacent tie rods with freedom to move up and down, and washers holding all of the links parallel to the two side members with sufficient looseness to permit each individual link to tilt on adjacent rods and to move away from the tie rods at either or both ends of the link.

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